April 2003

WATER CONSERVATION NEWS

"Building sustainability, reliability, and accountability through efficient water use"

In this issue...

CALFED Bay-Delta Program Water Use Efficiency Element, Part 1 of 3

This is the first of a three-part series about CALFED's Water Use Efficiency element. This article introduces the program's components and implementation plan. Following articles will focus on the agricultural, urban, managed wetlands and recycling components of the element and on implementation.

By Mark Roberson, CALFED Program

The CALFED Bay-Delta Program is an unprecedented effort to develop and implement a long-term comprehensive plan that will restore the ecological health and improve water management for beneficial uses of the Bay-Delta. The Program, developed over the past nine years, represents a cooperative effort among 23 state and federal agencies and the public. The CALFED WUE Element is one of the cornerstones of CALFED's water management strategy. The ultimate goal of the WUE Element is to develop a set of programs and assurances that:

- contributes to CALFED goals and objectives,
- has broad stakeholder acceptance,
- fosters efficient water use, and
- helps support a sustainable economy and ecosystem.

The goals of the WUE Element will be met by providing tools to local water suppliers and water users to improve water use efficiency. These tools include financial and technical assistance, research, and assurances.

The CALFED WUE element is one of several common Program elements and is one of the cornerstones of CALFED's water management strategy. The WUE Element is unique nationally in its magnitude and its aggressive approach to water management. Consisting of agricultural, urban, water recycling and managed refuges components, the WUE element is based on the recognition that although efficiency measures are implemented locally and regionally, the benefits accrue at local, regional and statewide levels. The WUE element has three main goals that support the overall CALFED effort:

1. Reduce water demand through "real water" conservation
2. Improve water quality by altering volume, concentration, timing and location of return flows
3. Improve ecosystem health by increasing in-stream flows to meet ecosystem needs.

Actions to be performed by the WUE Program element currently include:

- Implement agricultural and urban conservation incentive programs to provide grant funding for water management actions that provide cost-effective improvements in water quality and reduced ecosystem impacts.
- Implement water recycling programs to provide grant funding for water management actions that provide cost-effective improvement in water quality and reduced ecosystem impacts.

Continued. See "CALFED Bay-Delta Program" on page 2

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CALFED Bay-Delta Program

Continued from page 1.

- Identify, on a regional basis, ecosystem restoration and water supply reliability needs that are linked to irrigated agriculture. For each of the identified needs, provide an estimate of the potential contribution that irrigated agriculture could make toward the need.
- Help state and federal agencies expand their programs to provide increased levels of planning and technical assistance to local water suppliers and recycling agencies.
- Review, analyze and refine CALFED projections for WUE aggregate acre-feet of implementation savings and recycled water production.
- Assist the Agricultural Water Management Council in their effort to identify appropriate agricultural water conservation measures, set appropriate levels of effort, and certify or endorse water suppliers that are implementing locally cost-effective, feasible measures.
- Work with the California Urban Water Conservation Council (CUWCC) to establish an urban water conservation BMP certification process and set appropriate levels of effort in order to ensure that water suppliers are implementing cost-effective feasible measures.
- Convene an independent review panel on appropriate measurement. This panel will provide guidance that will help define appropriate measurement as it relates to surface water and groundwater use. The panel will prepare a consensus definition of appropriate measurement in 2003. At the completion of this stakeholder-technical process, CALFED agencies will work with the California Legislature to develop legislation for introduction and enactment in the 2003 legislative session requiring the appropriate measurement of all water uses in California.
- Promote the use of scientific review and collaboration to further the implementation of water use efficiency.

Mission Statement of the Office of Water Use Efficiency

"To advance the efficient management and use of California's water resources in cooperation with other government agencies and the private sector through technical and financial assistance."

Ensuring Application of Science to Water Use Efficiency Projects

By Manucher Alemi, Office of Water Use Efficiency

The CALFED Program intends to ensure the overall scientific rigor and integration of the scientific linkages among CALFED Program Elements. One of the CALFED Program Elements is Water Use Efficiency. The application of science to WUE programs is the responsibility of the CALFED WUE program and implementing agencies and the use of applied science to the CALFED WUE Program Element will be supported by a newly formed WUE Science Application Committee (SAC) whose objective is to ensure that applied science is used in the design, implementation, and evaluation of WUE-funded projects.

SAC is responsible for providing insight and advice to WUE implementing agencies' staff on the use of science in applied research, pilot projects and implementation projects in identification of research priorities, quantification of costs and benefits, and quantification of future water use efficiency estimates. Additionally, SAC will serve as a communication forum among water management communities to share scientific findings of their respective projects. SAC membership will include a mix of CALFED and CALFED agency/partner staff, water agency project managers, stakeholders and consultants.

DWR is an implementing agency and has the responsibility of managing the project solicitation package and project award processes and monitoring the funds and progress of the individual projects that are awarded. DWR's Office of Water Use Efficiency has begun forming the SAC and will seek SAC input in implementing its WUE projects.

Two of SAC's immediate tasks will be providing insight to OWUE staff on the upcoming proposal solicitation packages and evaluation of the proposals. Examples of other tasks include:

1. evaluating monitoring adequacy of currently WUE-funded projects and evaluating the results of the individual and collective projects,
2. recommending adaptive management changes and applied research needs where necessary to meet the desired WUE goals and
3. making projections of potential benefits from WUE-funded projects.

For more information on SAC contact Manucher Alemi at (916) 651-9662, e-mail malemi@water.ca.gov.

New Funds for Water Use Efficiency

By Marsha Prillwitz, Office of Water Use Efficiency

A new source of funding for future water use efficiency projects is now available. The CALFED Bay-Delta Program—a cooperative effort of over 20 state and federal agencies—funds water use efficiency projects throughout the state. The California Department of Water Resources is the CALFED state agency designated to manage the Water Use Efficiency grant and loan program through the Office of Water Use Efficiency's Financial Assistance Unit.

In 2001, 53 water use efficiency projects were funded with $12 million of state General Funds authorized by Senate Bill 23, split equally between agricultural and urban projects. These projects are approaching completion with final reports due this summer. As well as achieving water savings, these projects will contribute toward water quality improvements and environmental benefits. Already, we are receiving reports of substantial benefits associated with these projects.

Alameda County Water District Helps Schools Improve Water Management
Alameda County Water District is working to improve water management by helping school districts retrofit large landscape areas. Automated irrigation systems, sub-meters and a central irrigation system are being installed to improve efficiency. The District anticipates water savings of 2,200 acre-feet over 20 years.

In 2002, 21 Proposition 13 Urban Water Conservation grants totaling $9 million and $0.8 million in Agricultural Water Conservation Feasibility Study grants were awarded and are getting under way. We are now in the process of reviewing the 2003 round of Proposition 13 Urban Water Conservation grant applications. $18 million is available for this cycle. Final funding decisions will be made by June 2003.

Proposition 50

Voters recently passed Proposition 50, the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002; OWUE is getting ready to administer these funds. Under Chapter Seven, $180 million is dedicated to urban and agricultural water conservation, recycling and other water use efficiency projects. DWR will administer the urban and agricultural components of this program while the State Water Resources Control Board will be responsible for the recycling component.

Lost Hills Water District Reduces Lost Water
Two projects funded in 2001 consisted of concrete lining approximately $3^{1/2}$ miles of canals. The purpose was to prevent seepage losses to a saline shallow groundwater table. Benefits of the concrete lining include 5,320 acre-feet of water saved over 20 years and a reduction in drainage and maintenance costs.

The first grant cycle will kick off this fall with the release of the 2004 Water Use Efficiency Proposal Solicitation Package. Approximately $30 million will be available for agricultural and urban water conservation projects. As more information becomes available about the new grant program, it will be posted at: www.owue.water.ca.gov/finance/index.cfm. If you have questions, contact Marsha Prillwitz at marshap@water.ca.gov or (916) 651-9674.

Quantitative Irrigation Scheduling Does Work

By Kent Frame, Office of Water Use Efficiency

A major part of irrigation management is deciding when to irrigate and how much water to apply. Several tools such as CIMIS are available to help agricultural growers and turf managers administering parks, golf courses and other landscapes to develop water budgets and plans for determining when to irrigate and how much water to apply. Other programs such as mobile irrigation laboratories, scheduling software, and Office of Water Use Efficiency technical assistance can be used to aid in making irrigation and planning decisions. Consultants can also be hired to provide advice on irrigation scheduling.

What is CIMIS?

CIMIS is a program unit of the California Department of Water Resources. It is an integrated network of over 125 automated and computerized weather stations statewide that measure climatic parameters with various sensors, such as wind speed, air temperature, solar radiation. By measuring these parameters staff can calculate Evapotranspiration (ET) and other useful factors. ET is the combined process of water loss to the atmosphere by evaporation and water loss through plant tissues. Reference Evapotranspiration (ETo) is a term used to describe the ET rate from a standardized surface, such as grass or alfalfa and is expressed in either inches or millimeters. The ETo for an average year is referred to as normal year ETo. ETo varies by location, time and weather conditions.

How can I use ETo data for irrigation scheduling?

While ETo indicates how much water a reference crop needs over a certain time period for a healthy growth and development, one must be able to estimate Crop Evapotranspiration (ETc) to accurately prepare an irrigation schedule. Daily ETc is derived by multiplying ETo by a Crop Coefficient (Kc). By adding up daily ETc values and including losses due to system inefficiencies, distribution uniformity, and some basic plant soil relationships, it is possible to know how much water to apply and when it is time to irrigate. Although irrigation scheduling can be complicated, it is analogous to balancing a checkbook. The analogy is in that additions of irrigation water and precipitation can be considered as deposits, whereas ET, runoff, and deep percolation can be considered as withdrawals. This method of irrigation scheduling is often referred to as a water budget of irrigation scheduling. Some examples of water districts using a similar method are the Panoche Water District, Coachella Water District, Santa Clara Valley Water District and the San Benito County Water District.

Table 1
Water Budget Scheduling Example for Seed Alfalfa

Date	Effective Rainfall	Irrigation	Crop ET (inches)	Depletion	MAD
July 1	0.00	0.00	0.00	0.00	2.50
July 2	0.00	0.00	0.30	0.30	2.20
July 3	0.00	0.00	0.19	0.49	2.01
July 4	0.00	0.00	0.22	0.71	1.79
July 5	0.00	0.00	0.28	0.99	1.51
July 6	0.00	0.00	0.25	1.24	1.26
July 7	0.00	0.00	0.26	1.50	1.00
July 8	0.00	0.00	0.28	1.78	0.72
July 9	0.00	0.00	0.32	2.10	0.40
July 10	0.00	0.00	0.36	2.46	0.04
July 11	0.00	2.50	0.40	0.36	2.14
July 12	0.00	0.00	0.22	0.58	1.92
July 13	0.42	0.00	0.11	0.27	2.23
July 14	0.25	0.00	0.15	0.17	2.33
July 15	0.00	0.00	0.25	0.42	2.08

Available water (AW) in root zone = 5.0 inches
Management allowable depletion (MAD)= 50%AW = 2.5 inches
Yield threshold depletion (YTD) = 2.6 inches.

Water Budget Method

The water budget method is simply an accounting procedure similar to the book keeping required to balance a checking account. For irrigation scheduling, soil water content is balanced. The amount of water that is lost as ETc is analogous to writing checks. The water that enters the soil reservoir (as rain or irrigation) is analogous to depositing funds. By keeping records of these transactions, it is possible to know how much water is in the soil reservoir at any time. The initial balance can be determined by direct observation or assessed after a thorough wetting of the soil by irrigation or winter rains. Daily quantities of ET are depleted until the soil water has been reduced to a determined level. At that point irrigation should be applied with a net amount equivalent to the accumulated ET and other losses since the last irrigation. The soil profile is thus recharged to field capacity (FC), which is the quantity of water stored in a soil volume after drainage of gravitational water, and the cycle begins again. If full recharge is not desired or not possible, the new balance can be determined from the net irrigation amount or by field observations. This method, however, may not work well at locations where contributions to crop ET from the water table or other source cannot be quantified.

Only a portion of the water content can be potentially removed from a volume of soil by a crop and this quantity is called available water (AW). The amount of available water within the crop root zone at any given time is often called "soil moisture reservoir." Unfortunately, only a fraction of the reservoir is readily available to the crop. To prevent yield-reducing crop water stress, one must know how dry the soil can get before yield-reducing

continued on next page.

crop stress will occur, and this is referred to as the yield threshold depletion or (YTD). The value of the YTD is mainly dependent upon the crop sensitivity to stress, root depth and density, and soil type.

The ultimate choice of how much water to deplete before irrigation is made by the irrigation manager who must also consider cultural practices, labor, water deliveries or other considerations. Irrigation is timed depending on a management allowable depletion (MAD), which is the percentage of available water the irrigator will allow plants to deplete before irrigating or the depth of water that the irrigator will allow plants to extract from the root zone between irrigations. Generally, the MAD is selected to be less than or equal to the YTD. Another term commonly used in the water budget method is soil moisture depletion (SMD). SMD is the amount of water required at any time to fill the root zone to field capacity. Crop water use can be calculated with reference evapotranspiration (ETo) from CIMIS and Kc as ETc = ETo x Kc. These ETc estimates can be used to determine day by day soil water depletion and thus can be used to schedule irrigation. Table 1, a tabular representation of the water budget method, can be used to illustrate this point. It shows that on July 11, 2.50 inches of beneficial water are required to refill the soil reservoir.

For more information on irrigation scheduling, KC's, other information, and contacts, visit the CIMIS Web site at www.CIMIS.water.ca.gov; also visit www.wateright.org and www.ipm.ucdavis.edu.

Other Factors to Consider

When the water budget irrigation method is used for scheduling irrigation, one must take into account other factors in addition to those mentioned above. These factors include irrigation system application rates, irrigation efficiency and leaching requirements. Water that runs off the field, percolates below the root zone in excess of leaching requirements, or other factors that contribute to poor distribution uniformity (DU) of the irrigation water and does not contribute to the soil reservoir must be accounted for. Therefore the actual amount of applied water can be greater than the 2.5 inches illustrated in the table above. For example, if 30 percent of the water is lost to non beneficial use, the irrigation efficiency is 70 percent and the required applied water rate would actually be 3.57 inches. This is determined by calculating, 2.50 / 0.70 = 3.57 inches. Determining the irrigation efficiency can only be done accurately by a system evaluation. Depending on the design, maintenance and management of an irrigation system, the efficiency, and DU can vary substantially. There are several government agencies and private consultants who can perform these evaluations or further assist you. For more information visit www.owue.water.ca.gov.

Normal Year Irrigation Schedules

A good planning tool for an irrigation manager is utilizing a normal year irrigation schedule based on historical weather data. This schedule can be developed before the irrigation season and can be used to estimate when irrigations will most likely be needed during the season. Normal year irrigation schedules can also be an important part of your overall management plan, assisting in planning the logistics of personnel schedules, fertilization applications, equipment, and other crop management decisions. A normal year schedule can also be utilized during the current year scheduling by using a method similar to the water budget illustration. By updating deposits and withdrawals during the irrigation season, using current ETo information, changes in irrigation dates or amounts will reflect current conditions. For example, lower than normal ETo values would result in either more time before the next irrigation or a smaller amount of required water for the same irrigation date. This updating can be done easily on paper or by using a spreadsheet on a computer system.

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www.owue.water.ca.gov/news/news.cfm

The Promise of Regulated Deficit Irrigation in California's Orchards and Vineyards

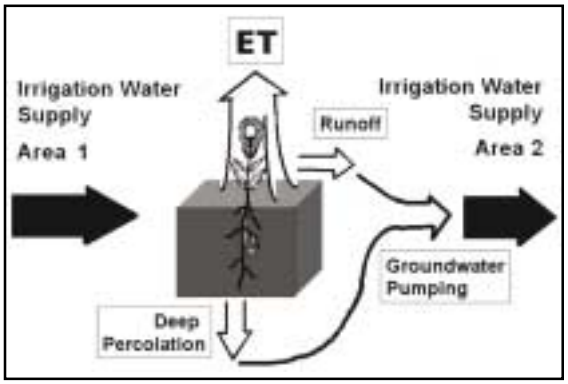
By David A. Goldhamer, Water Management Specialist, University of California, and Elias Fereres, Professor, IAS-CSIC and University of Cordoba, Spain

Agriculture uses about 75 percent of all the developed water in California, and the expanding population and efforts to maintain or improve animal habitat and stream flows will require even more water in the future. With no significant expansion of water supplies and possible partial loss of existing resources, agricultural water use is being seen by many as a potential water source. The recent controversy over the transfer of water from agriculture in Imperial County to the City of San Diego illustrates this issue. Some maintain that Imperial growers could free up the amount of water in question by improving their surface irrigation management, such as waste less water by reducing deep percolation below the crop root zone or end of field runoff. The growers argue that there are limits to how much water can be saved by reducing irrigation water losses (also called improving application efficiency) and point to reduced planting acreage, increased salinity, and associated loss of production and agricultural jobs as likely effects.

Statewide, California growers have steadily improved their application efficiency over the last couple decades. Moreover, deep percolation and runoff are usually only temporary losses on a small scale (the field being irrigated). Although quality may be degraded by fertilizers and other agricultural chemicals, water lost to deep percolation eventually moves into the water tables where it can be pumped and reused (see Figure 1). An exception to this is when it enters a salty, perched water table, usually making it unusable, or when it flows to the ocean. Runoff is often collected and reused on another field on the farm. Recognizing this and the fact that most California growers have become highly efficient in their irrigation management shows that there is limited opportunity to free up net water by improving application efficiency. Additionally, the use of California Irrigation Management Information System (see "Quantitative Irrigation Scheduling Does Work") data has allowed growers not to over-irrigate crops, minimizing the loss of water to deep percolation.

Generally a near-linear relationship exists between ET and crop production because transpiration, the movement of water vapor from the interior of the leaf to the surrounding atmosphere and the uptake of carbon dioxide, the basic building block required in the process of photosynthesis, both use the same plumbing at the leaf surface—the stomata. These are very small openings usually located on the undersides of leaves that regulate the movement of both water vapor and carbon dioxide. Indeed, it's often said that the plant trades water for carbon and if the goal is to maximize carbon uptake to achieve high yields, potential transpiration must be met. Thus, limiting transpiration (water stress) has usually been associated with production losses and lower grower profit.

Figure 1
Fate of Applied Irrigation Water



While this is true for most field and row crops, it's not necessarily true for trees and vines. Lack of water (water stress) reduces the vegetative growth of plants but doesn't necessarily result in reduced fruit yield in trees and vines as it does with most field and row crops (cotton being an exception). Thus it is possible to reduce transpiration of trees and vines without reducing yield.

We have conducted RDI research on the major tree crops in California—pistachio, olive, prune, and citrus—and identified numerous species where significant amounts of water can be saved without having a negative impact on production or grower profit. We found that while the relationship between gross fruit yield (mean of three years) and applied water was fairly linear (see Figure 2a) relationship between gross revenue ($/acre) and applied water was completely different (see Figure 2b). Many of the RDI regimes had higher gross revenue than the full irrigation control while applying from 4 to 8 inches less water. This was due to significantly lower creasing (higher fruit quality), especially with early season stress. This illustrates a major difference between row/field crops and tree/vine crops.

Almond trees present the best opportunity to couple RDI with adjusted horticultural management not only to reduce water consumption but also to address two critical health issues facing the industry—agricultural burning and dust during harvest. Again working in the southern San Joaquin Valley and supported by the California Almond Board, we tested various RDI regimes ranging from water savings of 15 to almost 50 percent of potential orchard ET. We showed that mild stress over most of the season can be imposed with little negative influence on production and substantial water savings. However, a potentially more significant finding involved the RDI regimes that imposed moderate to severe preharvest (April to July) stress. These strategies reduced vegetative growth (canopy size) and individual kernel weight but had no influence on fruit load; the smaller, more compact trees had higher fruiting density (nuts per unit of canopy volume) than fully irrigated trees. Thus, one could increase the planting density (trees/acre), thereby increasing total nut production (number/acre) compared with conventionally planted and irrigated trees. The downside is that fruit size would be lower, which may somewhat

decrease the value of the nuts. On the other hand, the need to prune trees would be much less, reducing the amount of prunings and burning.

Growers currently mechanically shake trees at harvest and leave the nuts on the ground to dry for 7 to 10 days before they are swept up. The sweeping and mechanical collection can create dust and related health concerns. Our research showed that preharvest stress can accelerate hull splitting, allowing for an earlier harvest, which benefits growers in a number of ways; earlier hull split allows the nuts to dry more completely on the tree prior to mechanical tree shaking. We believe that this presents the option of growers harvesting directly from the tree into nut catching machines, as is done currently in pistachio and prune orchards. This would eliminate the dust and other problems associated with nuts drying on the ground, such as ant damage and soil-borne bacteria infection.

Winegrapes is another crop where stress can substantially improve fruit quality. The irrigation of winegrapes was against the law in some European countries, such as Spain, until recently because of real or perceived negative irrigation-related impacts on wine quality. Some stress, however, is beneficial as it can reduce berry size, thereby increasing the ratio of skin to fruit volume. This is important to wine makers since the skin contains constituents important in wine color, taste, and chemical make-up.

Using our research and that of others and conservative estimates of current practices in orchards and vineyards, we have calculated a range of water savings for the major tree crops and winegrapes in California. These estimates are based on RDI regimes that do not reduce grower profits. One tree crop, walnuts, is excluded since we have no data showing that RDI can be successful although further research is planned. Water savings on the low end, those that we believe are currently achievable, total about 1 million acre-feet (see Table 1). If we include RDI adoption coupled with adjusted horticultural

Continued.
See "Regulated Deficit Irrigation" on page 9.

Figure 2

Production and Revenue Functions for Applied Water Using Mean 1998 - 2000 for Navel Oranges (Frost Nucellar) in Southern San Joaquin Valley

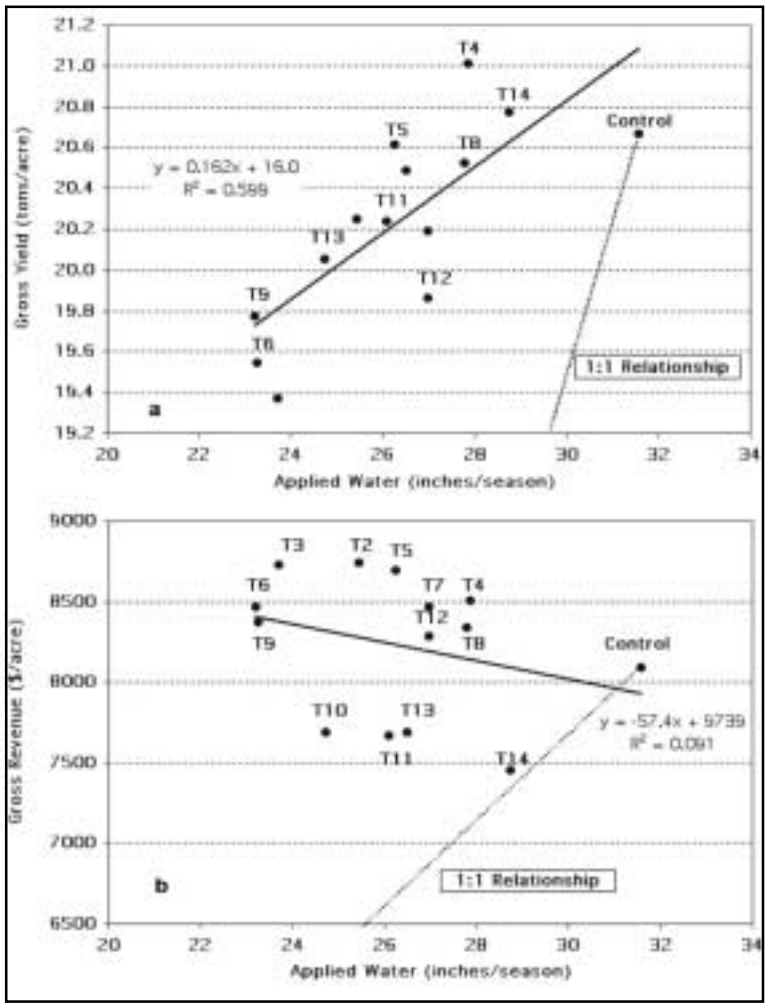


Table 1

Range of Estimated Water Savings Relative to Current Practices Using Regulated Deficit Irrigation

Crop	Bearing Acreage (acres)	Estimated Savings (inches)	Range of Water Savings (acre-ft)
Almonds	530,000	8 to 14	424,000 to 618,000
Winegrapes	480,000	8 to 12	320,000 to 480,000
Citrus	244,000	6 to 8	122,000 to 163,000
Pistachios	78,000	10 to 12	65,000 to 78,000
Prunes	76,000	6 to 12	38,000 to 76,000
Peaches	70,000	4 to 8	23,000 to 47,000
Olives	36,000	6 to 10	18,000 to 30,000
Apples and Pears	49,000	4 to 8	16,000 to 33,000
Walnuts	196,000	Unknown	Unknown
Total	**1,759,000**	**52 to 84**	**1,026,000 to 1,525,000**

2002 Recycled Water Task Force: Progress and Milestones

By Fawzi Karajeh, Office of Water Use Efficiency

The 2002 Recycled Water Task Force, created April 3, 2002, by the Department of Water Resources as mandated by Assembly Bill 331, has steadily progressed toward the fulfillment of its mission. The Task Force is a cooperative effort of the California Department of Water Resources, the State Water Resources Control Board, and the Department of Health Services. Its goal consists of identifying opportunities for the beneficial use of recycled water and proposing recommendations for removing impediments and constraints to increasing the safe use of recycled water on a wider scale. The Task Force undertaking is of paramount importance and fits categorically in the statewide efforts toward a more comprehensive and sustainable water resources management strategy. Recycled water is considered as new water that supplements the state water budget. This new water has the special characteristic of being drought proof, making it a reliable source of water.

On November 19, 2002, in conjunction with the ACWA's Fall Conference in Anaheim, and on January 10, 2003 in Sacramento the Task Force conducted its fifth and sixth meetings respectively. The November 19 meeting, attended by over 50 people, focused on presentations of the six different RWTF workgroups' white papers: Public Education and Outreach, Science & Health/ Indirect Potable Reuse, Plumbing Code/ Cross-Connection Control, Funding/ CALFED Coordination, Regulations & Permitting and Economics. The agenda also included a presentation by the WateReuse Foundation President Ron Young entitled *WateReuse Foundation and Its Role in Water Recycling* and an expert in-depth presentation by Bob Castle of the Marin Municipal Water District entitled *Lack of Uniform Interpretation of State Standards in Relation to Recycled Water*. The January 10 meeting, attended by over 60 people, focused on deliberating and prioritizing the draft recommendations presented to them by the workgroups. Though all recommendations presented will be included in the Task Force Report, the Task Force voted to consider 13 recommendations as their top priorities.

For more information about the 2002 Recycled Water Task Force and its different workgroups visit www.owue.water.ca.gov/recycle or contact one of the following staff:

Taskforce members discuss issues during the January 10 meeting in Sacramento.

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Use of Waterless Urinals on the Rise

By Manucher Alemi, Office of Water Use Efficiency

To save water, Cal/EPA has initiated a demonstration project to use waterless urinals in its headquarters building in Sacramento. The ribbon-cutting ceremony of a demonstration project for the use of waterless urinals on the second floor of the Cal/EPA building was held in January 2003. In a pilot project, three waterless urinals have been installed in the men's restroom. The manufacturer's specifications state that it saves 40,000 gallons of water and is odorless. The cartridge needs to be replaced periodically. Other brands can be flushed and replaced less frequently. Cartridges can cost from $5.00 to $15.00 each, depending on the brand, and can be easily replaced. DWR will soon install waterless urinals in the Resources Building to test the efficacy, customer satisfaction, and operational issues of this technology.

At present, the State Plumbing Code requires all restroom fixtures have a potable water connection. However, some local jurisdictions have the authority to waive the requirement within their area and install the waterless urinals (i.e., Pasadena Rose Bowl). Metropolitan Water District of Southern California has offered rebates for the use of waterless urinals. The waterless urinals do save water, and would not require a water connection and fixtures such as valves. This technology can save significant water for facilities that experience a high frequency of restroom use (such as restaurants, bars, sports facilities, and office buildings).

Ribbon-cutting ceremony for the new waterless urinals.

Recycled Water Task Force Field Tour

By Fawzi Karajeh and Nancy King, Office of Water Use Efficiency

On January 7, 2003, members of the Recycled Water Task Force, as well as representatives from various water agencies, took a bus tour of a few Los Angeles, California facilities. The tour was organized by the Office of Water Use Efficiency. At the first stop, Earle Hartling, the LA Water Recycling Coordinator, led a tour of the wastewater treatment facilities including the 40-year-old groundwater recharge spreading fields of the Los Angeles County Sanitation District in Whittier. The system incorporates conventional tertiary treatment along with advanced treatment of nitrification and denitrification. One tour participant, Dan Carlson of the City of Santa Rosa Utilities Department, commented that it was beneficial to see how this Title 22 plant has been producing recycled water for a variety of use types.

While on the bus traveling south to Irvine, Andy Hui of the Metropolitan Water District enlightened the participants with information regarding MWD's water recycling and desalination efforts. Then at the next stop in Irvine, Marilyn Smith and Norris Brandt of the Irvine Ranch Water District greeted the group. The participants enjoyed a tour of the well-appointed dual-plumbed Opus 2 Building which allowed attendees to see how recycled water can be used in the flushing of toilets and urinals, and for cooling towers. Several participants were impressed with the use of recycled water in high-rise buildings. Diana Robles of the State Water Resources Control Board – Office of Water Recycling, commenting about the visit, said it "was very clear that there was no possibility of a cross-connection when the engineer explained to us what actually took place during the construction." Muriel Watson of the Revolting Grandmas, said "the thing that really attracted my attention was that this new city started off right and they're proud of the fact that they started out right . . . This is the direction I'd like to see us go." Watson was referring to the pipes that were labeled and restrooms that had signs informing visitors: "In the matter of conservation, we are using recycled water for flushing the toilets."

The Irvine's Opus 2 Building cooling towers fed by recycled water.

The final stop was in Fountain Valley at the Orange County Water District. There, Associate General Manager Bill Everest described Orange County's current and future work on recycled water advanced treatment processes including the Groundwater Replenishment System. The group then toured Water Factory 21 and the new state-of-the-art GWR System's demonstration facilities, which include microfiltration, reverse osmosis, ultraviolet light and hydrogen peroxide disinfection systems. Participant Dan Carlson was enthusiastic about the Orange County recycled water work: past, present, and future. He said he was most impressed with their work, "not only what they're doing, what they've been doing so long, where they are headed, where the new project may take them, where I think most of us need to be in this industry in the future."

Earle Hartling, the Water Recycling Coordinator, speaks to participants at the wastewater treatment facility of the Los Angeles County Sanitation District in Whittier, California.

Regulated Deficit Irrigation

continued from page 7

practices, such as the higher almond density plantings and improved, more precise methods of identifying tree stress, we believe that 1.5 million acre-feet can be saved. We are currently conducting research on developing electronic sensors that can accurately detect tree stress thus allowing the management of RDI strategies with precision and without risks.

Today's farming economy has resulted in the steady conversion of relatively low-value row crop land into higher profit orchards and vineyards. This process only enhances the scale of potential RDI adoption. Achieving the promise of RDI depends on growers recognizing the benefits of managed water stress. This requires demonstrating on a large scale that RDI can be successful in their terms—profits are maintained or increased—and that the higher level of irrigation management required is within the ability of on-farm personnel. We believe that RDI in orchards and vineyards could be a key component in this state's effort to meet the growing demand for water and at the same time, preserve and protect permanent crop production.

Water Utilities Lighten The Load With LightWash

By Jennifer Fox, LightWash Rebate Program Administered by Energy Solutions

Promoting high efficiency commercial clothes washers leads to significant reductions in customer water and energy consumption and wastewater disposal. In fact, replacing just one conventional commercial clothes washer with a high efficiency clothes washer saves 21,000 gallons of water per year and reduces washer-related energy use by over 50 percent. There have been several successful water utility rebate programs and a very limited number of energy utility programs addressing this product category, but the resource efficiency synergies available support a more integrated program approach in California.

In fact, in many parts of California, a new program called "LightWash" is integrating energy and water utility incentives to help business and institutional customers replace washers and achieve resource savings and economic benefits. The LightWash Program works with California water utilities to offer combined energy and water conservation rebates of up to $450 per unit on qualifying high efficiency commercial clothes washers.

The publicly funded program offers rebates to multi-family and institutional common area laundry facilities, businesses and institutions with on-premise laundry, and coin laundry stores that are customers of PG&E, SoCalGas or SDG&E and a participating water utility. The list of participating water utility service areas is growing rapidly.

Water, Energy and Cost Savings From Efficient Clothes Washers

A variety of models are available for multi-housing, coin laundry store, and commercial on-premise applications that can reduce water use by 35 to 50 percent and cut energy use by 50 percent or more. About 80 to 85 percent of the energy used for washing clothes is for heating the water, so significant energy savings are achieved through water efficiency. Furthermore, high efficiency washers often extract more water, which can reduce dryer cycle times and use less detergent, providing additional environmental and economic savings.

The combination of water and energy savings goes beyond individual buildings and coin laundry stores. Water supply, transportation, distribution and treatment is the largest electrical end-use in California. On average, water reductions from a single high efficiency commercial clothes washer will result in savings of approximately 72 kWh for supply, treatment and delivery of potable water and 44 kWh in wastewater disposal per year. Wash performance is excellent too, so customers and tenants benefit beyond the resource savings. Not surprisingly, these better clothes washers often cost more, so the LightWash Program provides rebates of up to $450 to eligible customers to help offset the higher initial purchase price. Most importantly, the combination of the rebates and the lifetime of water/wastewater and energy savings make high efficiency washers the best economic choice.

LightWash From the Customer Perspective

LightWash offers eligible water utility customers combined rebates of up to $450 per qualified commercial clothes washer whether purchased or leased. Currently, over 100 commercial washers qualify (the list is available online at www.lightwash.com). These models, from a range of manufacturers—Continental, GE, Huebsch, Maytag, Speed Queen, Staber, Unimac, Wascomat, and

continued on next page.

Savings from Choosing a High Efficiency Washer Over a Standard Washer are Significant

A qualified high performance commercial clothes washer in a laundry room with a gas water heater—used 4 times (turns) per day—can save a bundle compared to a standard commercial clothes washer.[a]

Annual Energy Savings:	$36[b]
Annual Water/Sewer Savings:	$54[c]
Total Combined Savings:	$90/year/washer
Average Cost of High Efficiency Commercial Washer	$1200
Less Typical LightWash Rebate	($400)
Final Cost of High Efficiency Commercial Washer	$800
Average Cost of Standard Commercial Washer	$600
Cost Premium for High Efficiency Washer	**$200**
High Efficiency Washer Lifetime Net Savings[d] =	$435/washer

a. Compared to a standard washer. Based on an independent field study by Battelle Pacific Northwest National Laboratory at Leisure World Laguna Woods, CA. See www.pnl.gov/buildings/download_reports.html
b. Based on natural gas @$0.75/therm and electricity @13.0 cents/kWh.
c. Based on $3.00/thousand gallons water/sewer rate.
d. Based on a 7-year life. Non-discounted $$ using current utility rates. Savings achieved with an electric water heater are greater.

Whirlpool—are often equipped with either a coin-box or card-reader, but need not be to qualify. Route operators and dealers can help their customers select qualifying products.

LightWash rebates are only paid to the water utility account holder whether clothes washers are leased or purchased. There is no limit on the number of rebates per eligible customer. The LightWash program lasts through December 31, 2003 or until program funds run out. To apply for a LightWash rebate or obtain more information, customers are encouraged to visit www.lightwash.com or call toll-free (866) 307-WASH (9274).

Over 200 Participating Water Utility Service Areas and Counting

In 2001, the California Public Utilities Commission (CPUC), held a solicitation for non-utility sponsored energy efficiency proposals. Energy Solutions, a resource efficiency firm based in Oakland, proposed the LightWash program with support from the California Urban Water Conservation Council and several of its members. LightWash was one of a limited number of proposals selected by the CPUC for funding in 2002 and 2003. LightWash was launched in September 2002 and currently customers of over 200 local water utilities are eligible for LightWash program benefits.

The LightWash program offers participating water utilities turnkey program implementation services at no cost. The only required contribution by participating water utilities is the rebate co-payment, the amount of which is determined by each water utility. A simple memorandum of understanding establishes participation. Where necessary, the program may be customized to address local program requirements. It could be one of the easiest program opportunities of 2003. Water agencies and utilities interested in learning more about the program should contact Ted Pope at (510) 482-4420 ext 221 or ted@energy-solution.com.

LightWash is implemented by Energy Solutions with funding from participating water utilities and California energy utility ratepayers under the auspices of the California Public Utilities Commission.

Plant a Tree for Arbor Day

Julie Saare-Edmonds, Office of Water Use Efficiency

National Arbor Day is always the last Friday of April; this year it is April 25. Arbor Day reminds us how valuable trees are in an urban landscape and how this value shouldn't be underestimated. Trees offer so many benefits that an urban forestry program should be a part of every community. Deciduous trees planted on the east, south and west sides of buildings reduce the need for air conditioning, thus saving energy and making the occupants more comfortable. Carefully placed shade trees can allow air conditioners to work more efficiently by shading the air conditioning unit. Trees planted to shade windows help prevent sun damage to interior furnishings. These same deciduous trees will allow the winter sun through, warming the building and reducing heating costs. Shade trees make patios and play yards more enjoyable and parking lots bearable. Urban forests such as these reduce the effect of urban heat islands where heat is stored in pavement and buildings making the air temperature as much as 12 degrees warmer than surrounding areas. According to the National Arbor Day Foundation, urban forests across the country save nearly $2 billion per year in energy costs by reducing the need to cool buildings.

As part of the natural environment, trees act as cover, nesting sites and food sources for many types of wildlife. Tree roots will also stabilize soil, preventing hillside erosion and aid in stream bank stabilization. Trees and other plants improve air quality by absorbing air pollutants and converting carbon dioxide to oxygen. Trees can reduce the use of water for irrigation by taking up space that might otherwise be high-water-using turf areas. Plants growing beneath trees need less water than the same kinds growing in sun.

The benefits of trees can't be fully realized unless some care and planning goes into planting and maintaining trees. The "right plant for the right place" is a good philosophy to follow when selecting trees. Climate is probably the most important factor in selecting plants for a landscape. Plants can't be expected to perform well if the local climate is warmer, colder, wetter or drier than the climate the plant is adapted to. Once climate issues are addressed the next important factor for selection is size. Large trees in small urban lots may cause many problems for the owner and may require expensive removal after several years. Large trees provide lots of shade, but if they overwhelm the yard or a neighbor's yard, their usefulness comes into question. Tall trees planted under utility lines are another hazard of poor selection. Trees that grow into power lines must be pruned severely to avoid damaging the utility lines. This results in an ugly, disease-prone tree that won't serve the purpose intended. Shorter trees that mature at less than 20 feet tall are better choices for small yards and under utility lines.

To keep trees safe, healthy and attractive, prune off any dead or diseased wood, and routinely check for insect damage or signs of disease. Never "top" a tree when pruning. This makes the tree unsightly, creates an opportunity for disease to set in and will ultimately create a hazard tree. Once topped, a tree can never recover its natural beauty. It will instead react to the drastic pruning by sending out many weakly attached branches. These branches tend to fall off over time and can be a serious hazard once they reach a few inches in diameter. Fungal disease can set in causing interior decay resulting in the failure of limbs and even the entire tree.

To find more about urban forestry and how you can improve your community with trees visit the National Arbor Day Web site at www.arborday.org. To find out if your community has a shade tree program contact the UC Extension Master Gardeners for your county or visit www.mastergardeners.org.

Shape Your Home Landscape to Reduce Fire Hazards

Julie Saare-Edmonds, Office of Water Use Efficiency

Fire is a natural part of many of California ecosystems. Fires crack seed coats of some types of plants, open the cones on closed-cone pines, and clear overgrown brush. Low intensity ground fires will clear the forest floor of duff leaving open mineral soils that Ponderosa Pines require for seedlings to grow. Low intensity fires also rejuvenate shrubs and grassland, clearing the way for new growth that is important food for wildlife. Unfortunately, this natural fire cycle becomes a hazard when development occurs in fire-prone areas. In California, some of the most fire-prone areas, chaparral, coastal sage scrub and gray pine forests of the Coastal Ranges and Sierra Nevada foothills, are also some of the most desirable areas of the state for people to live.

To reduce the chance of losing homes and other structures to fire, the landscape around the home can be modified to create a defensible space, at least 30 feet, around a structure. Slopes, fuel loads and other factors may require a larger space. Check with your local fire department for information specific to your site. To create this space, remove thick heavy brush, dry grass, dead plants, and wood from the area. Routinely clean leaves and needles from the structure's roof. To minimize fire ladders, prune the lower branches of trees and plant only groundcover (less than 2 feet tall) or lawn under trees. Plant trees so that branches will grow no closer than 10 feet from the structure and allow gaps between tree canopies. In shrub beds, remove dead plants and rake out leaves and needles.

Mulching is beneficial to conserve soil moisture as long as materials of large particle size (such as bark, wood chips or gravel) are used. Avoid using leaves, needles and grass clippings as mulch because fine materials can blow around and spread a fire. Allow gaps between shrub bed areas to stop the horizontal spread of fire. Locate higher-water-using plants nearer the house because it will be easier to water them and they are usually less flammable due to moisture content. There are many low-water-using plants that are fire retardant, but can also be very water thrifty overall. Landscaping with fire retardant plants will lessen the risk of a fire spreading. These plants should be deep-soaked occasionally so they stay healthy and maintain their moisture content.

These are general guidelines for improving fire safety in regions prone to wildfires. Consult with your local fire department or the California Department of Forestry and Fire Protection (916) 653-5123 or www.fire.ca.gov/Education/FireSafety.asp for more information. Also, visit California Fire Safe Council Web site www.firesafecouncil.org

Some Fire Resistant Plants

Here is a list of fire retardant plants. Using these plants alone will not make a fire-safe landscape. Maintaining the defensible space and the plants growing in the landscape is the most important thing to do.

Trees
Callistemon viminalis, Weeping Bottlebrush
Ceratonia siliqua, Carob Tree
Prunus ilicifolia lyonii, Catalina Cherry*
Rhus lancea, African Sumac

Shrubs
Callistemon citrinus, Lemon Bottlebrush
Cistus purpurea, Orchid Rockrose
Heteromeles arbutifolia, Toyon*
Prunus ilicifolia, Holly-Leaf Cherry*
Rhamnus californica, Coffeeberry*
Rhus integrifolia, Lemonade Berry*

Vines
Campsis radicans, Trumpet creeper
Solanum jasminoides, Potato Vine

Groundcovers
Arctostaphylos uva-ursi, Bearberry*
Arctotheca calendula, Cape Weed
Baccharis pilularis, Dwarf Coyote Brush*
Ceanothus gloriosus, "Point Reyes," Point Reyes Ceanothus*
Ceanothus griseus horizontalis, Carmel Creeper*
Delosperma alba, Ice Plant
Drosanthemum floribundum, Ice Plant
Hypericum calycinum, Aaron's Beard
Lantana montevidensis, Trailing Lantana
Myoporum parvifolium prostratum, Creeping Myoporum
Rosmarinus officinalis prostratus, Creeping Rosemary
Salvia sonomensis, Creeping Sage*

Perennials
Achillea tomentosa, Woolly Yarrow
Diplaucus sp., Monkey Flower*
Santolina chamaecyparissus, Gray Lavender Cotton
Santolina virens, Green Lavender Cotton
Trichostemma lanatum, Woolly Blue Curls*
Zauschneria californica, California Fuchsia*

* California Native Plant

California Urban Water Conservation Council

By Mary Ann Dickinson, Executive Director

CUWCC Provides Technical Assistance Help

The California Urban Water Conservation Council is pleased to announce the hiring of Thomas Pape, of Best Management Partners in Oakland, to be the new technical advisor to help water agencies with their BMP implementation questions. He can be reached by leaving a message at (916) 552-5885, extension 21. All types of questions are being fielded regarding cost-effectiveness of projects, BMP feasibility, technical questions relating to implementation and MOU requirements.

Tom is also working on special pages for the Council's Web site that will provide information on each of the BMPs. For questions relating to BMP reporting, however, contact Beth Ernsberger at (916) 552-5885, extension 14.

Spanish Practical Plumbing Handbook Arrives!

The Council has printed a Spanish version of our wildly popular Practical Plumbing Handbook. With chapters including *Los ABCs de Plomeria* (The ABCs of Plumbing), and *Mantenimiento Preventivo* (Preventative Maintenance), the handbook is a user-friendly consumer guide to high-efficiency plumbing and how to keep it efficient and trouble-free. The handbook offers *ilustraciones ´tiles* (helpful illustrations) including water meters, kitchen faucets, and toilet schematics, to name a few. In addition, the handbook contains *tables ´tiles* (helpful charts) describing such items as the types of clothes washers, dishwater troubleshooting, methods of washing dishes, and a daily water budget.

The Spanish version is available from the Council for $2 each for Council members and $3 each for non-members (plus shipping & handling). That's only $1 more than its English counterpart. To order the Spanish Practical Plumbing Handbook or the English Practical Plumbing Handbook, contact the Council office at (916) 552-5885. You can also visit the Council's Web site at www.cuwcc.org, click on Publications, and place your order online.

Council Names 2002 Excellence Awards

At the Council's December plenary, two distinguished individuals were honored for their achievements in water conservation. Ed Thornhill was given the award for Statewide Innovations. Having worked 37 years for Metropolitan Water District of Southern California in various positions, Ed has now retired as head of the Conservation Unit. We will greatly miss his leadership and commitment to promoting water use efficiency throughout California. California and the Council have greatly benefited from Ed's integrity, diplomacy and vision.

As one of the primary authors of the Statewide Memorandum of Understanding (MOU), Ed was the force that kept the negotiations on track and productive. In addition to his helping to develop the MOU, Ed took pride in his involvement with a forum and decision-making process in which environmentalists and urban water agencies have an equal and shared ability to influence urban conservation policy and practices.

The Excellence Award for Local Innovations was given to Lynn Anderson-Rodriguez, in honor of her many years of water conservation leadership in the Central Coast counties of Ventura, Santa Barbara and San Luis Obispo, where she initiated the first water conservation programs in the 1980s. Lynn then mentored many new Water Conservation Coordinators, helping to develop and implement programs in numerous small water districts throughout the three-county area. Her level of activism, dedication to conservation, intelligence, integrity and compassion are unsurpassed and the Council was indeed honored to present her with an award.

Both honorees received citations and engraved mahogany mantel clocks to commemorate their achievement. We wish them both well.

Legislation

The Department of Water Resources Legislation Office is currently reviewing newly introduced water-related legislation and will provide a list of all new bills of interest to the readers of the Water Conservation News in the July issue.

Water Conservation Events

Irrigation System Evaluation Short Courses

The following classes are available for irrigation professionals through the Irrigation Training and Research Center and are sponsored by the U.S. Bureau of Reclamation, Mid-Pacific Region and Water Conservation Office, Department of Water Resources. For more information or to register visit www.itrc.org.

Evaluation Class 1: Theory and Laboratory Practice of Evaluations
June 16 to 18, 2003
This first class is ITRC's traditional comprehensive 2-1/2 day class which combines classroom and outdoor laboratory activities. Efficiency definitions and techniques of evaluation are emphasized, ranging from how to take a pressure measurement to what specific measurements are needed for evaluation of six distinct irrigation methods . The techniques and programs covered are the standard used for DWR funded evaluation projects throughout California.
Location: ITRC, Cal Poly, San Luis Obispo
Time: 8:00 am to 5:00 pm June 16 and 17, 8:00 am to Noon June 18
Fee: $200. (Class fee includes all class materials and lunch the first 2 days.)

Evaluation Class 2: San Joaquin Valley Field Evaluation of Drip/Micro Systems
June 18 to 20, 2003
This second class is a new 2-1/2 day class where we will travel to the San Joaquin Valley and perform the entire evaluations on two fields. The emphasis will be on performing the field evaluations for drip and microspray irrigation systems on trees/vines. This class will allow for more extensive field training to help with the comprehension of the materials from the first class. It is highly recommended that those attending this field session attend Class 1 or have field experience doing irrigation evaluations.
Location: San Joaquin Valley
Time: 1:00 pm to 5:00 pm on June 18, 8:00 am to 5:00 pm June 19 and 20
Fee: $100 (does not include lunch) Note: add $50 if ITRC is to provide transportation.

2003 Designer/Manager School of Irrigation

August 14 to 29, 2003
The Designer/Manager School, Sponsored by the U.S. Bureau of Reclamation, Mid-Pacific Region, is a comprehensive educational program offering a variety of classes designed for both agricultural and landscape irrigation professionals. All fees include class materials, software, and lunch.

AGRICULTURE/LANDSCAPE COURSES

Basic Soil, Plant and Water Relationships
August 14 to 15
Cost: $275
Topics include texture and structure, water holding capacity and retention, intake rates, evaporation, transpiration, soils classification and measurement of soil moisture and tension. This course covers IA Level II material.

Basic Pipeline Hydraulics
August 18-19
Cost: $275 (*deduct $20 if you bring your own laptop computer to this class.*)
Topics include pipe materials and sizes, mainline computations, tapered pipe and branches, energy equation, friction and elevation changes as well as minor losses

Pumps I
August 20
Cost: $165
Topics include Pump curves, pumps in series and parallel, system curves and TDH computations for vertical and booster pumps efficiency.

AGRICULTURE COURSES

Chemigation
August 21
Cost: $165
Topics include fertilizers, techniques for various irrigation methods, reducing leaching losses, injection equipment and safety.

Pumps II
August 21 to 22
Cost: $275
Suggested prerequisite: Basic Pipeline Hydraulics, Pumps I
Topics include submersible pumps, well screens and well development, variable speeds; electric and engine, shaft losses, shaft sizing, maintenance and troubleshooting (sponsored by the USBR, Mid-Pacific Region).

Row Crop Drip Irrigation
August 22
Cost: $165
Suggested prerequisite: Basic Pipeline Hydraulics
Topics include design layouts, flushing, fittings, how design relates to management, hose installation and retrieval.

Drip/Micro Irrigation Design
August 25 to 27
Cost: $400 *(deduct $20 if you bring your own laptop computer to this class)*
Suggested Prerequisite: Basic Soil, Plant & Water Relationships; Basic Pipeline Hydraulics; Pumps I
Topics include filtration, design procedure of hardware selection and hydraulics, emitter and micro-system designs, buried drip for trees and vines, plugging prevention.

Irrigation Scheduling, Salinity and Drainage
August 28 to 29
Cost: $275
Suggested prerequisite: Basic Soil, Plant and Water Relationships
Topics include ETo and crop coefficients, practical irrigation scheduling, how efficiency and uniformity influence scheduling, drainage concepts and layouts, salinity, leaching requirements and reclamation.

LANDSCAPE COURSES

Landscape Irrigation Auditing
August 25 to 26
Cost: $235
Suggested prerequisite: Basic Soil, Plant and Water Relationships; Basic Pipeline Hydraulics
Topics include irrigation evaluation and irrigation scheduling and drip, micro, and bubbler sprinklers.

Water Budgeting For Landscape
August 27
Cost: $95
Topics include designing and managing a site to a water budget (allows users to conform to AB 325, Model Landscape Ordinance).

Landscape Sprinkler Design
August 28
Cost: $165
Suggested prerequisite: Basic Soil, Plant and Water Relationships; Basic Pipeline Hydraulics
Topics include application rates, valves, piping, pipeline sizing, sprinkler selections and designing blocks.

Microirrigation For Landscape
August 29
Cost: $165
Topics include hydraulics of hoses, emitters and sprayers, equipment selection and maintenance of the system and matching equipment to plant materials and other stations.

Orange County Water District offers "Water 101" Class

Orange County, Water District is offering its "O.C. Water 101" class to address water issues from a global, national and local perspective. The class will explain how water leaders will meet the growing demands of water in Orange County. Instructors will focus on how Orange County, with its semi-arid desert climate, has been able to maintain lush parks, landscaped gardens and golf courses. In addition, students will participate in an on-site tour of Orange County Water District's water purification facility, During the tour, students will see advanced water purification technology, such as reverse osmosis and microfiltration.

The class will also address conservation measures that residents can use to save water at home. The free one-evening classes are intended for adults and are held on Wednesday evenings at OCWD's Fountain Valley, California office located at 10500 Ellis Avenue (at the comer of Ellis and Ward). Reservations are required. To make a reservation or to obtain more information call (714) 378-3217 or visit www.ocwd.com.

2003 classes are scheduled for:

Date	Time
May 28	6:30 - 8:30 p.m
June 25	6:30 - 8:30 p.m
.July 30	6:30 - 8:30 p.m
August 27	6:30 - 8:30 p.m
September 24	6:30 - 8:30 p.m
October 29	6:00 - 8:00 p.m.

Office of Water Use Efficiency Water Recycling/ Desalination Program

For more information about these events, visit www.owue.water.ca.gov/recycle/news/news.cfm.

WateReuse Foundation 2003 Annual Water Reuse Research Conference
June 2 to 3, 2003
Westin San Francisco Airport
San Francisco, California
Sponsored by the WateReuse Association. For more information visit www.watereuse.org.

Annual Symposium of the American Membrane Technology Association
August 4 to 5, 2003
Westin Resort
Boulder, Colorado
For more information visit www.membranes-amta.org.

Ninth Conference on Design Operation and Costs of Large Wastewater Treatment Plants
September 1 to 4, 2003
Prague, Czech Republic
For more information visit www.ace-cr.cz/htm 2003_Conference_IWA/Hl_strana.htm.

2003 WateReuse Annual Symposium
September 7 to 10, 2003
Marriott Rivercenter
San Antonio, Texas
Sponsored by the WateReuse Association. For more information visit www.watereuse.org.

International Desalination Association World Congress on Desalination and Water Reuse
September 28 to October 2, 2003
Atlantis Hotel
Paradise Island, Bahamas
For more information visit www.ida.bm.

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Address Correction Requested

The Kern-Tulare Water District and Rag Gulch Water District Team Up to Increase Irrigation Efficiency and Improve Groundwater Conditions

By Phil Anderson, Office of Water Use Efficiency

The Kern-Tulare Water District and Rag Gulch Water District (the districts), located north of Bakersfield in Kern and Tulare counties, share common water distribution systems and staff. Prior to their partnering in 1974, groundwater levels were falling at an average rate of 15 feet per year. Now however, as a result of importation of water into this area, groundwater levels are currently stable. The districts provide agricultural water service for 20,000 acres of high-value permanent crops such as grapes, citrus and nuts. Their facilities consist of 15 pumping plants and approximately 70 miles of pressurized pipeline to deliver water upslope from the Friant-Kern Canal. The annual irrigation demand is about 71,000 acre-feet, of which the districts have historically provided approximately 43,000 acre-feet. The remaining 28,000 acre-feet is provided by groundwater pumped by water users.

The goal of a recent project, funded through a 2001 CALFED grant and managed by the Department of Water Resources—The State of California provided $310,000 toward the project and the districts contributed a local cost share of over $200,000—to increase irrigation efficiency through increased flexibility in water ordering and delivery to the water users. An additional major priority is expansion of the districts' conjunctive use program. The districts plan to achieve these goals with the installation of a SCADA system to operate and monitor the distribution system and the installation of electrical controls at four pumping plants.

Prior to installation of the SCADA systems, the districts' personnel had to drive to pumping plants, reservoirs, and turnouts throughout the day to verify flow rates, pressures and water levels. With the newly installed SCADA systems, the districts have the ability to monitor pumping plants and reservoirs from a remote site. The recently installed controls permit automation of existing pumping plants to maintain a constant pressure in the pipeline. This allows water users to make changes to their delivery rates without impacting other water users on the pipeline, while reducing the risk of over-pressuring and damaging the districts' facilities. (The project facility improvements were completed in August 2002.)

The districts anticipate approximately a ten percent reduction in water use as a result of the project. They will demonstrate improved efficiencies through a comparison of pre- and post- project annual water use in acre-feet per acre. Additionally, they will report associated reductions in groundwater pumping.

Correction

The name of the author was inadvertently left off the article *Columbia Canal Company Converts from Flood to Drip* that appeared in the January 2003 issue of Water Conservation News. Phil Anderson of the Office of Water Use Efficiency wrote the article.